DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of claim 1 in the reply filed on March 28, 2008 is acknowledged.

Claim Objections

2. Claim 1 is objected to because of the following informalities: When a claim sets forth a plurality of elements or steps, each element or step of the claim should be separated by a line indentation. Also, the operations listed in the first three lines should be recited as positive active steps. Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

5. Claim 1 recites the limitation "the melt zone" and "the surface layer" in line 13. There is insufficient antecedent basis for these limitations in the claim.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dzigiris et al. ("Fundamentals of Basalt Fibers Production Technology and Basalt Fiber Properties") and Powell (2,594,799) in view of Aslanova (RU 2118300), Wechter (1,912,811) and Kibol et al. (UK 10762). Dzigiris et al. teach a method of producing fibers of rock comprising of loading fractured rocks into a melting furnace, melting the rocks (page 3, last 2 full paragraphs), homogenizing the melt (page 2, 11th full paragraph), drawing fibers from the melt, lubricating and winding the fiber onto a bobbin (page 12, 5th paragraph). Dzigiris also teaches using various rocks as the source of raw material for the fibers such as amphibolites, porphyrites, and igneous rocks including basalt because igneous rocks are a non-scarce raw material that is widespread and almost unlimited. Similarly Powell teaches a method for producing fibers of rock comprising basalt and other volcanic glass and rocks (col. 6 lines 50-59). It would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized other known volcanic glass/rocks in the making of fibers of rocks, such as dacite and rhyodacite because of it silicate nature and of its unlimited availability.

8. Dzigiris teaches a homogenization step, but does not specify a stabilization step in a melting furnace feeder. Aslanova teaches a method for manufacturing fiber from rock comprising of feeding rocks to a melting furnace, melting the rocks, and stabilizing the melt in a feeder (page 2, 5th paragraph). It would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized the stabilization step of Aslanova in the process of Dzigiris in order to secure the components ratio in the mixture, as taught by Aslanova.

9. Concerning the processing of the raw material into a fiber, others in the art teach conditions and steps for processing and treating rocks as a raw material.

10. For instance, Wechter teaches preheating rocks to remove bound water and to burn up organic components such as carbon (page 1, lines 32-44). It would have been obvious to one ordinary skill in the art at the time of the invention to have heated the rocks to necessary temperatures (such as 700°C) and for the necessary time (such as 15 minutes) required by the specific rock in order to ensure the efficient removal of moisture and organics. Also, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized such a preheating step in the process of Dzigiris and Powell in order to allow the slow and gradual removal of the water and organics for avoiding the dangers of explosions and disintegration if the raw material was just simply introduced to the high melting temperatures without the removal, as taught by Wechter (page 2 lines 64-80).

11. Additionally, Powell further teaches crushing the rocks to a desired predetermined size such as 200 mesh, and that the desired particle size is determined by the diameter of the fiber to be produced (col. 4 line 74 to col. 5 line 5). It would have been obvious to one of ordinary skill in the art at the time of the invention to have selectively crushed the rocks to a desired size (such as 15μm) to achieve the desired fiber size as demonstrated by Powell.

12. Regarding the melting condition, Dzigiris teaches peculiarities with rock melting such as the stages (including silicate forming and glass forming) that the rocks go through while melting and that by the end of the melting phase, all particles are melted,

hence an amporhism degree of at least 96%. Dzigiris also discuss how the melting process is tightly interrelated with the melt viscosity. However, Dzigiris does not mention a specific melting temperature of 2105-2200°C or a specific viscosity of the melt. Kibol et al. teaches a process for manufacturing fiber of rocks comprising of melting and homogenizing the rocks into a melt and providing an example of a melting temperature of 2150°C (Table 2) and a viscosity of 110-500 pz (page 1). It would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized the necessary temperatures needed to achieve complete melting, such as 2150°C which results in a viscosity necessary for fiber drawing as exemplified by Kibol, in order to accommodate the specific rocks utilized as the raw material.

13. Dzigiris further teaches a homogenization and stabilization of the melt at 1450°C (page 1 bottom half to all of page 2). Also, as already mentioned above, Dzigiris teaches drawing the fibers and depicts in figure 7 the drawing of the fibers from the melt zone located below the surface layer.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Queenie Dehghan whose telephone number is (571)272-8209. The examiner can normally be reached on Monday through Friday 9:00am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on 571-272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Steven P. Griffin/
Supervisory Patent Examiner, Art Unit 1791

Q Dehghan